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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,863	03/12/2004	Joerg Radecker	INF-141	6608

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EXAMINER	
QUINTO, KEVIN V	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,863	RADECKER, JOERG	
	Examiner	Art Unit	
	Kevin Quinto	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,12,13 and 15-21* is/are rejected.

7)☒ Claim(s) *10,11 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5 August 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 12, 13, 18, 19, 20, and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claims 12 and 13 describe barrier materials with the notation, "Si-N, Si-O-N, Si-C, Si-O-C" while "Si-N" is used by claim 18. Although they appear to represent empirical formulas, the notation used in these claims is not clear as to what actual materials are being claimed. Therefore the metes and bounds of these claims (claims 12, 13, claim 18 and its dependent claims: 19, 20, and 21) are indefinite.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kuroi et al. (USPN 6,744,113 B2).

7. In reference to claim 1, Kuroi et al. (USPN 6,744,113 B2) discloses a similar method of fabrication. Figures 3-8 and 9-12 illustrate two different fabrication processes which both meet claim 1. Figure 2 is the final product of the processes shown in figures 3-8 and 9-12. In figures 3-8 and 9-12, a method for producing insulator structures in a semiconductor substrate is illustrated. An insulator trench is formed in a substrate (1). The insulator trenches are partially filled with a main layer (31d) made of an additive-doped insulator material in the course of an HDP deposition process based on a high density plasma (column 7, lines 41-43). A barrier layer (31ON1), which blocks an interaction of the additive with the semiconductor substrate (1), is produced before a deposition of the main layer (31D) in the course of the HDP deposition process.

8. With regard to claims 2 and 3, figures 3-8 and 9-12 each show that a predeposition process is controlled with the exclusion of halogens or halogen compounds (in the course of the HDP deposition process and before the deposition of the barrier layer) and an additional layer (31O1) of the insulator structure is produced. The additional layer (31O1) isolates the barrier layer (31ON1) from the semiconductor substrate (1). Furthermore, the predeposition process of the additional layer, the production of the barrier layer, and a main deposition process for the main layer are

controlled successively and in the same process chamber (column 7, lines 7-67, column 8, lines 1-46, column 9, lines 36-67, and column 10, lines 1-9).

9. In reference to claims 4 and 5, fluorine, a halogen, is used as the additive (column 7, lines 41-43).

10. With regard to claim 6, silicon oxide is provided (column 7, lines 41-43) as the insulator material (31D).

11. In reference to claim 7, figures 3-8 and 9-12 each show that an auxiliary process is controlled with the exclusion of halogens or halogen compounds (in the course of the HDP deposition process and after production of the main layer) and a termination layer (31O2) of the insulator structure is produced.

12. With regard to claim 8, the material (31D) deposited above the substrate surface in the course of the HDP deposition process is caused to recede as far as the substrate surface.

13. In reference to claim 9, Kuroi shows that transistors are provided (see figure 1) outside the insulator structures in the area of the substrate surface. Furthermore it is understood that these transistors may be n-channel or p-channel transistors.

14. In reference to claim 15, Kuroi (USPN 6,744,113 B2) discloses a similar device in figure 2. In figures 3-8 and 9-12, a method for producing insulator structures in a semiconductor substrate is illustrated for the device of figure 2. An insulator trench is formed in a substrate (1). The insulator trenches are partially filled with a main layer (31d) made of a halogen-doped silicon oxide in the course of an HDP deposition process based on a high density plasma (column 7, lines 41-43). A barrier layer

(31ON1), which blocks an interaction of the halogen with the semiconductor substrate (1), is produced before a deposition of the main layer (31D) in the course of the HDP deposition process.

15. With regard to claim 16, Kuroi forms an additional layer (31O1) that isolates the barrier layer (31ON1) from the semiconductor substrate (1) and is formed in direct connection with the barrier layer (31ON1). Kuroi does not disclose forming the additional layer (31O1) by an "HDP deposition process." However the limitation "HDP deposition process" places the claim into the form of a **product-by-process claim**:

> Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi* et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in " product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 16 does not distinguish over the Kuroi reference regardless of the process used to form the barrier layer, because only the final product is relevant, and not the process of making such as an HDP deposition process.

16. In reference to claim 17, the additional layer (31O1) is an undoped layer.

17. So far as understood in claim 18, the barrier layer (31ON1) is a nitrided silicon oxide.

18. So far as understood in claim 19, the halogen is fluorine (column 7, lines 41-43).

19. So far as understood in claim 20, Kuroi teaches all of the claimed invention except for the exact dimensions of the trench. Although the Kuroi structure does not teach the exact dimensions of the trench as that claimed by Applicant:

> The shape, size, dimension differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re* Leshin, 125 USPQ 416.

Therefore claim 20 is not patentably distinguishable over the Kuroi reference.

20. So far as understood in claim 21, there is a termination layer (31O2) made of an undoped silicon oxide (column 6, lines 1-2) which is arranged on a main layer.

Allowable Subject Matter

21. Claims 10, 11, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

22. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests or renders obvious a fabrication method for a trench insulating structure which provides in the same process chamber, a first oxide layer in the trench by chemical vapor deposition, a barrier layer formed over the first oxide layer, a halogen doped insulation layer formed by a high density plasma process, and a final undoped oxide layer over the halogen doped insulation layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KVQ

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